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ABSTRACT

The main purpose of this study was to develop predictive expressions for community college curricula, particularly in the vocational areas, that would indicate the probable success of entering freshmen. The study, conducted at San Diego City and San Diego Mesa Colleges during 1967-68, included 2,279 students. The subjects were divided into groups based on enrollment program, sex, and ethnic group. Step-wise regression was applied to 12 predictor variables including: American College Test (ACT) scores, high school grades, educational and economic level of parents, age of students, units of enrollment, and hours of outside employment. The study indicates that: (1) ACT scores do not significantly improve the validity of predictive expressions based exclusively on non-test variables; and (2) expressions developed from the 12 predictor variables have no greater accuracy than the simple prediction that all students will receive a grade point average of 2.00 or better. (Author/CA)

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Analysis of Prospective and Present Students in the San Diego Junior Colleges Relative to Their Vocational Programs

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San Diego Community Colleges

San Diego, California

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CHAPTER I

SUMMARY AND DISCUSSION

The principal purpose of the study was to develop predictive expressions for community college curricula, particularly in the vocational areas, that would indicate the probability of success of entering freshmen. A related objective was to evaluate the effectiveness and use of the American College Test (ACT) for community colleges, especially as it relates to vocational education and guidance. (See Appendix A.)

The study was conducted at San Diego City and San Diego Mesa Colleges, both of which are a part of the San Diego Community College District. The Evening College students were not included. Subjects for the study were limited to those who: entered college for the first time at City or Mesa, were still enrolled at the end of the semester, and had ACT test data available.

Included in the study were 2,279 students: 1,231 from 1967 and 1,052 from 1968. The study sample comprised approximately 12% of the total day college enrollment for 1967 and 1968. The study subjects were further divided into groups based on enrollment program (vocational, non-vocational), sex, and ethnic group (minority, non-minority).

Stepwise regression was applied to 12 predictor variables; these included American College Test scores, high school grades, educational and economic level of parents, age of students, units of enrollment, and hours of outside employment.

The dependent variable for the predictive expressions that were developed in the study was first semester grade point average. The study answered the following questions:

1. *Do American College Test scores significantly improve the validity of predictive expressions based exclusively on non-test variables?*

2. *Are the predictive expressions (including American College Test scores) an improvement over the simple prediction that all students will earn a grade point average of 2.00 ("C") or better?*

3. *Do the predicted grade point averages have practical validity?*

Conclusions

This study clearly indicates that the American College Test scores do not significantly improve the validity of predictive expressions based exclusively on non-test variables. The study also clearly indicates that expressions developed from the twelve predictor variables (including American College Test scores and high school grades) have no greater accuracy than the simple prediction: all students will receive a grade point average of 2.00 or better.

The predictive expressions were judged to be invalid for advisement, counseling, or placement of individuals. Only in the case of the minority sub-group did the correlation (multiple R) reach 0.55. However, of the eight predictive variables that were used to arrive at the R of 0.55, only one was an ACT test score (natural science). For all other subgroups, including the total sample, the correlation between predictive expressions and grade point average was less than 0.55.

It is especially significant that, for minority students, English and mathematics test scores showed correlation coefficients of 0.019 and 0.083 with grade point averages. Thus, for all practical purposes, there is no relationship between the test scores and grades. It is ironic that these are the two test scores most commonly used for placement purposes.

Discussion

Vocational Education

Findings of this study have massive implications for vocational education. Most students who have evidenced unsatisfactory educational success rely heavily on vocational education for improvement. Indiscriminant use of "placement" tests, especially in light of the present study findings, could close a door that, to many students, represents a last chance for educational advancement.

Funding Emphasis

With approximately 250,000 community college freshmen entering colleges each fall, admissions testing represents a large investment. The benefit associated with this large investment is severely questioned by the results of this study. It is strongly recommended that we redirect a substantial amount of our energies from admission testing to instructional areas that indicate a greater benefit potential.

Minority Groups

In addition, the authors firmly believe that any individual who is denied or even discouraged from enrolling on the basis of predictive expressions similar to those investigated by this and a previous study (Heinkel, 1969) should question strongly the basis on which such a decision is made. The potential harm and discouragement that probably occur with the very students that need help and encouragement is incompatible with the concept of the "open door" community college. If there is a true concern for minority groups and disadvantaged students, we not only must seek ways to help them, but also must avoid those practices that are likely to damage their aspirations and likelihood of success.

CHAPTER II

PROBLEM

The "Open Door" policy of public, two-year institutions draws growing numbers of students into higher education. Nevertheless, the sizable number of community college students who are on academic probation, augmented by the alarming number of dropouts reported by some colleges, suggest that numerous students may not be finding the success in college that could have been expected for them. Many of these students might have persisted in college if they had been made more aware of their chance of success, based on certain factors, in the various vocational as well as the nonvocational programs available.

Community colleges offer many opportunities for course selection to entering students; so many, in fact, that a large proportion of beginning students hardly know what courses or curricular major they should select. The desire to increase student awareness of vocational course offerings and to assist individuals in the selection of courses and programs appropriate to their aspirations and abilities points up the need for the present research.

Purpose of the Study

The principal purpose of the study was to develop expressions for community college curricula, particularly in the vocational areas, that would indicate the probability of success of entering freshmen. A related objective was to evaluate the effectiveness and use of the American College Test (ACT) for community colleges, especially as it relates to vocational education and guidance. (See Appendix A.)

Description of the Problem

During the spring of 1967, the San Diego Community Colleges adopted the ACT as an instrument for placement and guidance purposes. Of seventy-nine California community colleges responding to a survey conducted in the fall of 1967, forty-eight reported that they were using the American College Test (ACT), which indicates the trend to use this testing program for incoming students. (Reilly, 1967) The ACT program predicts the probability of success for certain specified areas. However, the regression analysis used to determine these probabilities utilizes only test scores and high school grades; both sets of variables are non-manipulable. This study applied stepwise regression using additional variables, some being manipulable, thus giving students a measure of control through the choice of appropriate combinations of curriculum unit load and hours

of employment. Extensive use was made of ACT data as well as other variables suggested by Leland Medsker and James Trent (Project Talent, 1968) to develop equations predicting the probability of success.

The vocational and nonvocational divisions of the San Diego Community Colleges were examined in detail as prediction equations were developed -- predictions concerned with academic success. The answer to the question of what variables were to be included in the prediction equations was sought in published research and in consultation with counselors, administrators, and instructors acquainted with the colleges and their students.

The records of freshmen entering in the 1967 fall semester furnished the data used in the stepwise regression analysis for derivation of equations that give an estimated GPA for each student. This derived score (GPA) in turn was associated with the percentage of students who received a "C" average (2.0) or better. The analysis was performed only for curriculums in which there were 50 or more students for whom ACT data were available.

Limitations of the Study

The study was conducted at San Diego City and San Diego Mesa Colleges. Both are public two-year community colleges located in the city of San Diego, San Diego County,

California. They are a part of the San Diego Community College district. At the present time, there are three accredited San Diego Community Colleges: San Diego City College, San Diego Mesa College and San Diego Evening College. A fourth, San Diego Miramar College opened in September 1969 as a branch campus of San Diego City College.

The active enrollment of the San Diego Community Colleges for Fall, 1967, was: San Diego City, 3,969; San Diego Mesa, 5,470; San Diego Evening College, 8,793. The combined enrollment of the San Diego Community Colleges for Fall, 1967, was 18,232. These figures include both full-time and part-time students. (Hatalsan, 1967, p. 1)

The study was limited to first-time entering students at San Diego City College and San Diego Mesa College for the 1967 and 1968 fall semesters. In addition, the study sample was limited to those students who had American College Test data available and who persisted through their first semester of college.

CHAPTER III

METHODOLOGY OF THE STUDY

The purpose of the study, as has been stated, was to develop and evaluate equations that would indicate probability of success of entering freshmen in community colleges. The equations were developed by using stepwise regression with variables selected for their potential value in forecasting academic success of students enrolled in community colleges. Special attention was focused on enrollees in the vocational areas.

Population and Study Samples

The study was conducted at San Diego City and San Diego Mesa Colleges, both of which are a part of the San Diego Community College District. The Evening College students were not included. Subjects for the study were limited to those who: entered college for the first time at City or Mesa, were still enrolled at the end of the semester, and had ACT test data available. Table 1 shows the district enrollment by college and division (program).

TABLE 1

1967, 1968 FALL ENROLLMENT OF THE SAN DIEGO COMMUNITY COLLEGES*

1967

College:	City		Mesa		Total	
	N	%	N	%	N	%
Divisions:						
Arts and Sciences	1683	43	3834	72	5517	58
Business	735	18	844	15	1579	17
Technical	954	24	733	13	1687	18
Trade Extension, Apprentices, Adult Ungraded	597	15	59	--	656	7
Total:	3969	100	5470	100	9439	100

1968

College:	City		Mesa		Total	
	N	%	N	%	N	%
Divisions:						
Arts and Sciences	1618	46	4231	70	5849	61
Business	781	21	941	16	1722	18
Technical	945	26	842	14	1787	19
Trade Extension, Apprentices, Adult Ungraded	221	7	11	--	232	2
Total:	3565	100	6025	100	9590	100

*Based on data provided by the Office of the Director of Operations, San Diego Community Colleges, San Diego, California (November, 1967 and 1968).

Included in the study were 2,279 students: 1,231 from 1967 and 1,052 from 1968. The study sample comprised approximately 12% of the total day college enrollment for 1967 and 1968. The study subjects were further divided into groups based on enrollment program (vocational, non-vocational), sex, and ethnic group (minority, non-minority).

Tables 2 and 3 show the subgroups that were analyzed, together with the number of students in each group.

TABLE 2

STUDY GROUPS CLASSIFIED BY SEX AND ENROLLMENT AREA

	1967			1968		
	Voc.	Non Voc.	Total	Voc.	Non Voc.	Total
Male	279	509	786	234	389	623
Female	173	272	445	154	275	429
Total	450	781	1239	388	664	1052

TABLE 3

STUDY GROUPS CLASSIFIED BY ETHNIC OR RACIAL AFFILIATION

1967			1968		
Minority	Non-Minority	Total	Minority	Non-Minority	Total
209	1022	1231	134	918	1052

Method of Analysis

Principal purpose of the study was to develop expressions that would predict grade point averages for community college students and to evaluate the effectiveness of these expressions. The following questions were investigated:

1. *From a list of available predictor variables, what combinations best predict grade point averages for community college students?*

2. *Do American College Test scores significantly improve the validity of predictive expressions based exclusively on non-test variables?*

3. *Based on predicted verses actual grade point averages, what are the probabilities of earning at least a 2.00 ("C") grade point average?*

4. *Do the above probabilities represent a practical, significant improvement over predicting that all students will earn at least a 2.00 grade point average?*

5. *Do the predicted grade point averages have practical validity?*

The method of analysis employed to answer each of the above questions follows.

QUESTION 1. *From a list of available predictor variables, what combinations best predict grade point averages for community college students?*

For each of the groups identified on page 22, stepwise regression analysis was performed to develop the best expressions that would predict grade point averages. Generally, this process selects from a given list of variables the most effective combination for predicting a specified criterion variable.

Computer program BMD02R, Stepwise Regression, version of June 2, 1964, Health Sciences Computing Facility, University of California at Los Angeles, was used. The F-level for inclusion was 0.01 and the F-level for deletion was 0.005 with a tolerance level of 0.001. The level of confidence was 0.01 for variables remaining in the multiple regression.

The list which follows presents the predictor variables used with the 1967 sample:

Family Income
Employment Hours
Birth Year
Enrollment Units
High School English Grade
High School Mathematics Grade
High School Social Science Grade
High School Natural Science Grade
American College Test English Score
American College Test Mathematics Score
American College Test Social Science Score
American College Test Natural Science Score

For 1968, family income and employment hours were replaced by father's educational level and mother's educational level.

Final predictor expressions included only those variables that improved the predictive "power" (increased the amount of variance accounted for in grade point average) by 0.5%.

QUESTION 2. *Do American College Test scores significantly improve the validity of predictive expressions based exclusively on non-test variables?*

The American College Test scores were removed from the list of possible predictors. Stepwise regression then was applied to develop predictive expressions based exclusively on the eight non-test variables.

Using a ϕ of 0.5 indicated that the number of cases should be 80 to maintain a power of 0.7 for the 0.05 level of significance. Therefore 80 cases were randomly selected from the 1968 sample. Coefficients of correlation (r) were computed between: actual grades and predicted grades based on all 12 variables (r_{12}), actual grades and predicted grades based on the eight non-test variables (r_{13}), and between the two sets of predicted grades (r_{23}).

The two coefficients, r_{12} and r_{13}, were tested for a statistically significant difference. The formula used was

$$t = \frac{(r_{12} - r_{13}) \sqrt{(N - 3)(1 + r_{23})}}{\sqrt{2(1 - r_{12}^2 - r_{13}^2 - r_{23}^2 + 2r_{12}r_{13}r_{23})}}$$

This formula applies when the two correlation coefficients are based on the same sample and are correlated. (Ferguson, 1966, p. 189) The value of "t" required for statistical significance at the 0.05 level of confidence in a one-tailed test is 1.64.

QUESTION 3. *Based on predicted verses actual grade point averages, what are the probabilities of earning at least a 2.00 ("C") grade point average?*

The probabilities required for Question 3 were based on the standard error of prediction for the expressions from Question 1.

QUESTION 4. *Do the above probabilities represent a practical, significant improvement over predicting that all students will earn at least a 2.00 grade point average?*

The prediction that all students would earn at least a 2.00 grade point average was applied to each group. A list was made of those students who actually earned a grade point average of 2.00 or better. Another list recorded those students who earned less than a 2.00 grade point average. The efficiency of this simple predictive procedure was indicated by comparing the successful predictions (2.00 or higher) to the total group.

Comparative data for the predictive expressions from Question 1 were then derived. Lists were made of those students whose predicted and actual grade point averages were both greater than or equal to 2.00, whose predicted average was 2.00 or greater while the actual average was less than 2.00, and whose predicted average was less than 2.00 while the actual average was 2.00 or greater. The efficiency of the expressions was indicated by comparing the number of cases where there was agreement between actual and predicted

grade point averages relative to 2.00 to the total number of students in the group.

The indicated efficiencies of the above two methods were then compared to analyze possible benefits of the predictive expressions. The two methods were also tested for statistically significant differences (0.05 level of confidence) by using a formula for testing the difference between two proportions based on the same sample of individuals. (Ferguson, 1966, p. 189)

Method 1 is the prediction that all students will earn at least a 2.00 average and Method 2 is the prediction (relative to 2.00) calculated from the expressions developed for Question 1. The formula that was used is

$$z = \frac{D - A}{\sqrt{A + D}}$$

where A represents the number of students whose grade point averages were correctly predicted by Method 1 and incorrectly predicted (relative to 2.00) by Method 2, and D represents the number of students whose grade point averages were incorrectly predicted by Method 1 and correctly predicted by Method 2. The z required for statistical significance at the 0.05 level of confidence is 1.96.

QUESTION 5. *Do the predicted grade point averages have practical validity?*

The stepwise regression analysis program yielded a coefficient of correlation (multiple R) between predicted grade point averages and actual grade point averages. Multiple R's less than 0.55 indicate that less than 30% of the variability in actual grade point average was accounted for by the predictors.

For the answer to Question 5, R's less than 0.55 were considered to be too low for advisement, placement, or counseling of individuals.

CHAPTER IV

FINDINGS AND CONCLUSIONS

Chapter 4 includes a presentation, analysis and interpretation of the data relative to each of the five questions investigated.

QUESTION 1. *From a list of available predictor variables, what combinations best predict grade point averages for community college students?*

Tables 4 and 5 present correlation coefficients between individual predictors and grade point averages for the 1967 and 1968 study samples, respectively.

Generally, the tables indicate that predictors with the highest correlation to grades were birthyear, enrollment units, high school grade in social science, and American College Test score in social science. Predictors with the least correlation were education of mother and father, income, and high school grade in mathematics.

Table 6 presents the expressions that best predict grade point averages. The 1968 multiple R's resulting from the stepwise regression were consistently higher than the 1967 R's. Thus, the expressions are based on the 1968 sample.

TABLE 4

CORRELATION OF INDIVIDUAL PREDICTORS TO
GRADE POINT AVERAGES, 1967

PREDICTOR	GROUPS						
	Vocational N=450	Non-Vocational N=781	Males N=785	Females N=445	Minority N=209	Non-Minority N=1022	Total N=1231
Birth Year	-.152	-.289	-.195	-.193	.074	-.270	-.199
Hours of Employment	-.134	-.143	-.100	-.081	.005	-.170	-.138
Family Income	.007	.000	-.008	.033	-.027	-.014	.006
Units Enrolled	.032	-.100	.002	.036	.225	-.094	-.015
High School Grade in English	.256	.211	.174	.257	.172	.250	.240
High School Grade in Mathematics	.145	.004	.068	.105	.059	.108	.092
High School Grade in Social Science	.256	.219	.219	.247	.105	.278	.243
High School Grade in Natural Science	.145	.114	.087	.191	.027	.160	.134
American College Test Score in English	.169	.219	.099	.263	.199	.162	.189
American College Test Score in Mathematics	.134	.163	.191	.187	.230	.108	.145
American College Test Score in Social Science	.230	.263	.187	.340	.286	.210	.241
American College Test Score in Natural Science	.131	.114	.120	.243	.178	.091	.126

TABLE 5

CORRELATION OF INDIVIDUAL PREDICTORS TO
GRADE POINT AVERAGES, 1968

PREDICTOR	GROUPS						
	Vocational N=388	Non-Vocational N=660	Males N=623	Females N=425	Minority N=134	Non-Minority N=915	Total N=1048
Birth Year	-.207	-.245	-.204	-.241	-.299	-.218	-.220
Father's Education	.017	-.021	-.014	.022	-.144	-.001	.002
Mother's Education	-.048	-.047	-.073	-.031	-.147	-.061	-.050
Units Enrolled	.222	.335	.335	.207	.326	.247	.267
High School Grade in English	.249	.106	.161	.196	.228	.174	.193
High School Grade in Mathematics	.168	.086	.107	.166	.189	.135	.137
High School Grade in Social Science	.327	.108	.229	.244	.233	.239	.240
High School Grade in Natural Science	.139	.160	.111	.167	.211	.135	.145
American College Test Score in English	.178	.249	.153	.227	.019	.205	.200
American College Test Score in Mathematics	.163	.113	.196	.109	.083	.124	.140
American College Test Score in Social Science	.236	.296	.255	.272	.058	.263	.252
American College Test Score in Natural Science	.190	.214	.241	.195	.153	.175	.194

Legend for Table 6

BY	Birth year (last two digits only).
FE	Father's education level: (1) elementary school or less, (2) some high school, (3) high school graduate, (4) some college, (5) college degree, (6) postgraduate degree.
ME	Mother's education level.
UE	Units enrolled.
EG	High school English grade: (1) A, (2) B, (3) C, (4) D, (5) F.
MG	High school mathematics grade.
SG	High School social science grade.
NG	High School natural science grade.
ET	American College Test score in English.
MT	American College Test score in mathematics.
ST	American College Test score in social Science.
NT	American College Test score in natural science.
N	Number of students.
X	Estimated grade point average.
SE	Standard error of the estimated grade point average.
R	Coefficient of correlation (Multiple R).
R^2	Amount of variability in grade point average that was accounted for in the predictive expression.

TABLE 6

PREDICTIVE EXPRESSIONS FOR
GRADE POINT AVERAGES, 1968

GROUP	PARAMETERS	PREDICTION EQUATION
Vocational	N = 450 SE = .6747 R = .5168 R^2 = .2671	X = 4.21744 - .06040(BY) + .05915(UE) - .10792(NG) + .02443(ET) + .01623(ST)
Non-Vocational	N = 660 SE = .6588 R = .4737 R^2 = .2244	X = 4.65147 - .03963(BY) + .03789(UE) - .13317(EG) - .09050(MG) - .19965(SG) + .01261(NT)
Male	N = 623 SE = .6611 R = .4608 R^2 = .2123	X = 3.61719 - .04216(BY) + .05675(UE) - .14984(SG) + .02016(NT)
Female	N = 425 SE = .6803 R = .4873 R^2 = .2374	X = 4.75753 - .05241(BY) + .04556(UE) - .09156(EG) - .11980(MG) - .10778(SG) + .01636(ET) + .01245(ST)
Minority	N = 134 SE = .7311 R = .5644 R^2 = .3185	X = 5.55548 - .05615(BY) - .07290(FE) + .07400(UE) - .15945(EG) - .09139(MG) - .14441(SG) - .17541(NG) + .01296(NT)
Non-Minority	N = 915 SE = .6612 R = .4477 R^2 = .2004	X = 3.96434 - .04351(BY) + .04437(UE) - .06975(MG) - .13222(SG) + .01688(ET) + .01220(ST)
Total	N = 1048 SE = .6734 R = .4670 R^2 = .2180	X = 4.29521 - .04621(BY) + .04884(UE) - .09004(EG) - .07108(MG) - .11870(SG) + .01392(ET) + .01132(ST)

Of special interest in table 5 is that, for minority students, English and mathematics test scores showed correlation coefficients of .019 and .083 with grade point averages. Thus, for all practical purposes, there is no relationship between the test scores and grades. It is ironic that these are the two test scores most commonly used for placement purposes.

QUESTION 2. *Do American College Test scores significantly improve the validity of predictive expressions based exclusively on non-test variables?*

The above question was asked to determine if the American College Test scores would add appreciably to the predictive power of the remaining non-test variables. To answer question 2, the American College Test scores were first removed from the list of possible variables. The eight remaining variables were then used to develop a predictor expression for the total 1968 sample. The two predictive expressions (one with the American College Test scores, one without these scores) were then used to compute predicted grade point averages. Coefficients of correlation between the two sets of predicted grade point averages and the actual grade point averages were then tested for statistically significant differences. Table 7 shows the result of the test (see p. 35).

TABLE 7

DIFFERENCE BETWEEN COEFFICIENTS OF CORRELATION
TOTAL SAMPLE, 1968

LEGEND: X = Actual grade point averages
Y = Predicted grade point averages (including test score predictors)
Z = Predicted grade point averages (excluding test score predictors)

$\Sigma X = 182.4$	$\Sigma X^2 = 459.37$	$\Sigma XY = 415.99$	$r_{XY} = .46$ N = 80
$\Sigma Y = 178.6$	$\Sigma Y^2 = 407.22$	$\Sigma XZ = 413.54$	$r_{XZ} = .44$ df = 77
$\Sigma Z = 177.8$	$\Sigma Z^2 = 402.99$	$\Sigma YZ = 404.60$	$r_{YZ} = .98$ t = .77*

* $t_{.95} > 1.64$ (one-tailed test)

The American College Test scores did not significantly improve the validity of the non-test predictive expressions.

QUESTION 3. *Based on predicted verses actual grade point averages, what are the probabilities of earning at least a 2.00 ("C") grade point average?*

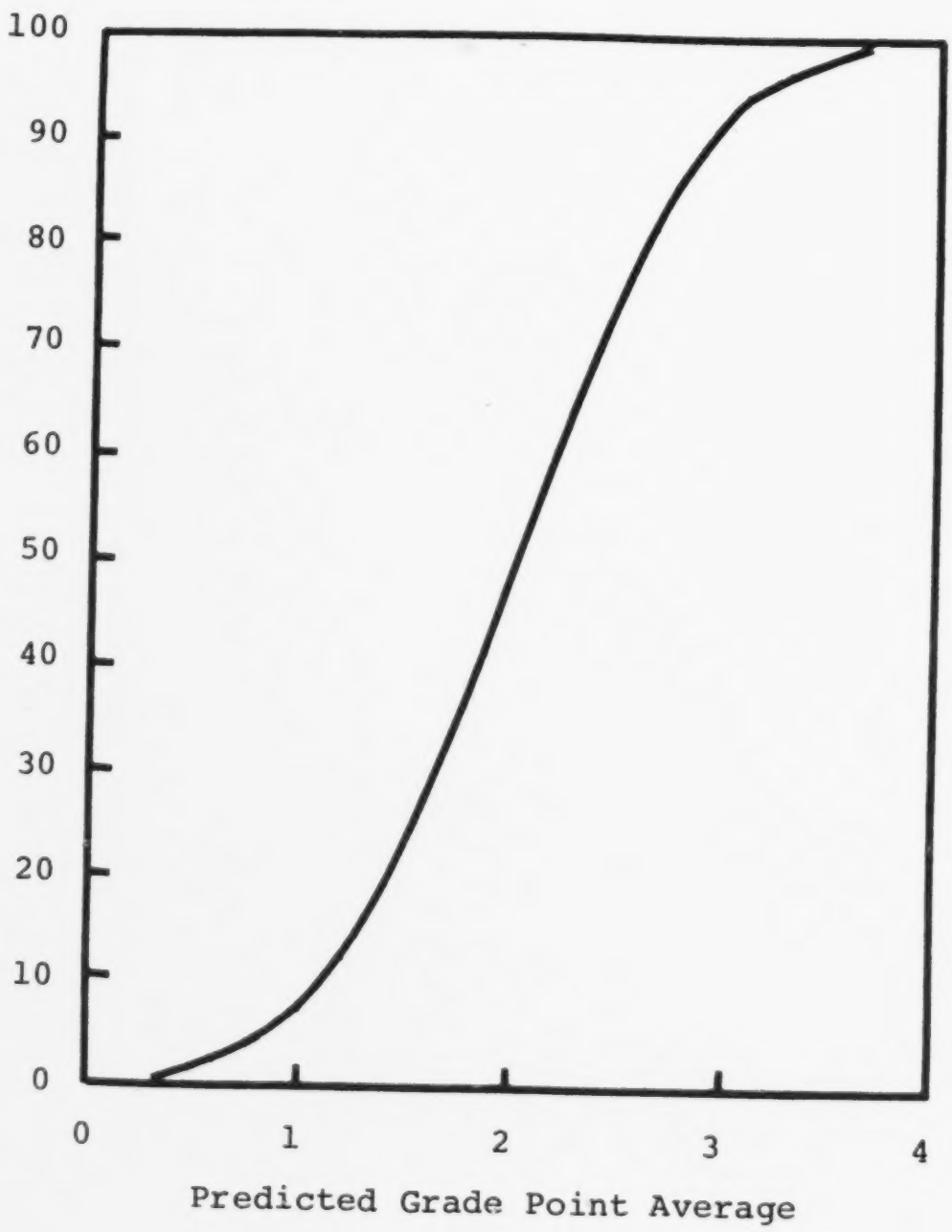
Table 8 indicates the theoretical probabilities of earning at least a 2.00 grade point average. The probabilities are based on the predictive expression (table 6, p. 33) for the total 1968 sample. The standard error of the estimated grade point averages was used for the computations.

TABLE 8

PROBABILITY OF EARNING AT LEAST
A 2.00 GRADE POINT AVERAGE
(Total 1968 Sample, N = 1231)

LEGEND: Y = Predicted grade point average.
P = Probability, in percent, of earning at least a 2.00 grade point average.

Y	P	Y	P	Y	P
3.6	99	2.4	72	1.2	12
3.4	98	2.2	62	1.0	7
3.2	96	2.0	50	.8	4
3.0	93	1.8	38	.6	2
2.8	88	1.6	28	.4	1
2.6	81	1.4	19		



QUESTION 4. *Do the above probabilities represent a practical, significant improvement over predicting that all students will earn at least a 2.00 grade point average?*

The validity of the predictive expressions from Question 1 was evaluated empirically by comparing the successful predictions based on the calculated expressions to the simple statement: all students will earn at least a 2.00 grade point average. Table 9 shows the proportion of successful prediction (relative to a 2.00 grade point average). Also shown are the "z" values from the tests for statistically significant differences.

TABLE 9

PROPORTION (%) OF SUCCESSFUL PREDICTIONS
1968 SAMPLE

Group	N	Method of Prediction		z***
		Simple*	Calculated**	
Vocational	388	73%	74%	.59
Non-Vocational	660	72%	72%	.42
Male	623	70%	69%	.51
Female	425	77%	80%	2.02
Minority	134	57%	64%	1.31
Non-Minority	915	76%	77%	.64
Total	1048	73%	72%	.37

* Predict all students will earn at least a 2.00 grade point average.
** Predictions based on expressions developed for question 1 (see table 6, p. 33).
*** z required for statistical significance at 0.05 level is 1.96.

For the female group, the calculated predictive expressions were more accurate than the "single" method of prediction. The difference was statistically significant at the 0.05 level. There were no statistically significant differences for the remaining groups.

QUESTION 5. *Do the predicted grade point averages have practical validity?*

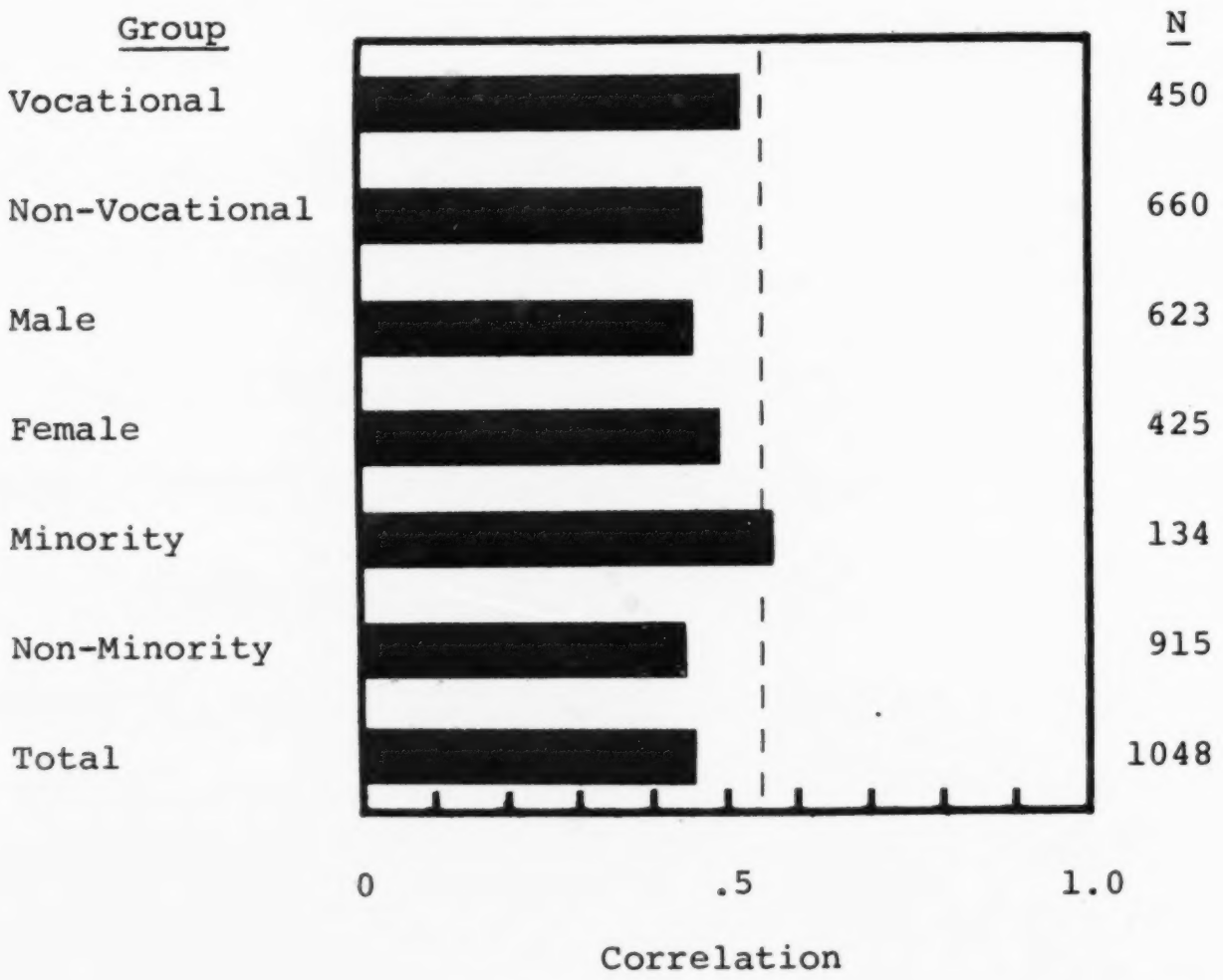
The multiple R was used as an indication of the validity of the table 6 predictive expressions. Correlations below 0.55 were considered too low for advising, counseling, or placement of individuals. Table 10 presents the correlations (multiple R) between predictor expressions and actual grade point averages. The dotted line indicates an R of 0.55. Only the minority group showed a correlation of 0.55 or higher.

TABLE 10

CORRELATION (MULTIPLE R) OF PREDICTIVE EXPRESSIONS WITH OVERALL GRADE POINT AVERAGES

Fall 1968

Correlations below 0.55 were considered too low for advisement, counseling, or placement of individuals.



CHAPTER V

REVIEW OF THE LITERATURE

Comparative studies of the academic aptitude level of community college students indicate that, in general, the median score for this group is somewhat lower that that of other college freshmen. It has been stated that despite the lower average there is a wide range of abilities among two-year college students. (Medsker, 1960, p. 30)

Thus with median scores of academic aptitude lower than other institutions, California community colleges are looking more and more toward entrance testing as an aid for guidance, counseling and placement of individuals. One of the testing programs used with greater frequency has been the American College Test. Of seventy-nine public community colleges in California responding to a survey conducted in the fall of 1967 by the California State Department of Education, forty-eight reported that they were using the American College Test. (Reilley, 1967) The ACT Research Department has conducted several studies relating to academic prediction in two- and four-year institutions.

Prediction of Success in Nonvocational Areas

The prediction of student accomplishment using the ACT Student Assessment was studied by Richards and Lutz. They found: (1) Moderate correlations among measures of academic potential and performance; (2) Moderate, but lower, correlations among nonclassroom achievements in the same or closely related areas; (3) low-to-moderate relationships among nonclassroom achievements in areas which are not closely related; and (4) low relationships between nonclassroom achievements and measures of academic potential and performance. (Richards and Lutz, 1967, pp. 1-30)

Considering all measures of academic accomplishment, Richards and Lutz found that the best predictor of success in college is high school grades. Weighted combinations of high school grades with ACT test scores are slightly better predictors than high school grades alone. In their study, however, Richards and Lutz obtained what would be considered an unsatisfactory validity coefficient of .25. They state that traditional standards of achievement should be rejected because the rationale for the nonacademic achievement scales grows out of an entirely different conceptual framework from that of traditional standards. Rather than evaluating potential for success on a single criterion, the non-academic achievement scales are based on the assumption that there are many kinds of excellence, and therefore many criteria for

prediction. Consequently, evaluating a person's potential for success involves many decisions rather than one.

As with many other researchers, Morgenfeld recognized that the high school grade average has been the best single predictor of college success. Nevertheless, he made adjustments to correct for differences in grading standards among schools. It was hypothesized that the value of high school grades to predict success in community colleges could be improved. Morgenfeld found that an "internal" method, using only information contained in the grades -- not depending on other data such as aptitude test scores, but using statistical methods for adjusting high school grades such as presented by Bloom and Peters (1961) in The Use of Academic Prediction Scales -- improved the predictive efficiency of first-year college grades by adjusting the predictor variable of the high school grade average. (Morgenfeld, 1967, pp. 75-98)

Prediction of Student Success in Vocational Areas

One objective of the present research is to relate vocational education to counseling and guidance at the community college level. Special attention needs to be given to studies relating specifically to the topic of predicting success in vocational areas of community colleges. Use of nonintellectual variables in predicting achievement holds promise for community college guidance

workers. Unfortunately, predictive studies related to success in technical and vocational areas in community colleges are few in number.

Prediction of success in training among electronics technicians was attempted by Broe in an unpublished doctoral dissertation. A total of 176 technicians in training at three large Southern California community colleges were tested. Broe used fifty predictor variables derived from the following sources: (1) Employee Aptitude Tests, (2) School and College Ability Tests, (3) Structure-Objective Rorschach Test, (4) biographical characteristics, and (5) four characteristics of motivation. With composite grades as a criterion, Broe reported statistical significance in twenty-nine of the predictors, with a range of .12 to .62 with twenty predictors being significant at the .01 level of confidence. (Broe, 1962, p. 110)

Technician trainees in two community colleges and a technical institute in the state of New York were studied by Greenwood (1962). A total of 444 students comprised the sample. They were being trained in either chemical, electrical, or mechanical technology. Freshman grade-point average was used as the criterion variable. Included also as predictor variables, along with scholastic scores, were high school grade averages in mathematics, English, and chemistry. Since the significant predictors varied

considerably for each school, it was concluded that separate selection standards should be used for different schools. It was also noted that average grades in mathematics and years of mathematics were important predictors in most of the curricula, and that intelligence test scores and English averages vary greatly for different curricula. (Malone, 1965, pp. 113-48)

Data have been summarized on the validity of aptitudes and school achievement for the prediction of success in high school vocational education programs. The results may be applicable to community college students. The predictability of success appears to be much greater in some vocational areas than others; e.g., medians obtained in shorthand and business education represent the upper extreme, while those obtained in auto mechanics, carpentry, and electricity represent the lower extreme. It has been stated that " . . . multiple regression techniques could result in appreciable gains in predictability in a given setting." (Prediger, et al., 1968, pp. 137-45)

Career Aspirations of Students with Chosen Majors

A sample of entering college freshmen was studied by Osipow and Gold with students divided into two groups on the basis of the consistency or inconsistency of their first and

second career preferences. (Osipow and Gold, 1967, pp. 346-49) The findings indicate that inconsistency of career preference was most likely the result of the student's recognition of his limited abilities. Subjects whose preferences were found to be inconsistent might have been somewhat hesitant to commit themselves academically because of reservations about their academic talents. It would appear, at least for college students, that apparent abilities play a very significant role in the shaping of vocational preferences and estimates of the probability of implementing them.

In another study of aspirations, students in their first year of college were found, generally, to do what they said they would do as reported on the Student Profile Section (SPS) of the American College Test (ACT). (Lutz, 1968, pp. 1-31) Lutz, in her study, found that the percentage of two-year college students who planned to work is considerably higher (73 percent and 74 percent for males and females, respectively) than for four-year college students (51 percent and 54 percent). Moreover, a substantial proportion of students at two-year colleges who did not plan to work at the time they wrote the ACT actually did work during their first year of college--48 percent for males and 40 percent for females.

Two other studies originating from the ACT Research Division call for mention at this time. The first study advanced four purposes concerning the determination of a

student's potential with respect to a broad range of achievements in college. (Holland and Richards, 1966, pp. 1-17) These researchers concluded that knowledge of student potential tends to: (1) better facilitate the student's choice of a college career, (2) enhance the college's ability to educate the student more comprehensively, (3) assist in determining student potential for accomplishments in later life which may go unrealized during the college years, and (4) better focus on which socioeducational influences foster the above-mentioned accomplishments. From their large sample (N=18,378), Holland and Richards concluded that since academic potential appears to be only one of several independent dimensions of talent, efforts should continue to be made to develop other measures of potential achievement and originality.

The second ACT study consisted of another large sample which compared the forecasting value of a student's initial report of his vocational choice with the Vocational Preference Inventory (VPI). (Holland and Lutz, 1968, pp. 428-36) Student vocational choices were categorized according to a six-category classification scheme for men and an eight-category scheme for women. The relationships between initial and final vocational choices, and between VPI high-point codes and final vocational choices, over eight- and twelve-month intervals were examined. These researchers concluded

that the predictive efficiency of a student's expressed choice is about twice that of the VPI. The results suggest that counselors should make greater use of a person's expressed vocational choices and that interest inventories should be used with more discrimination. Campbell (1968) was critical that Holland and Lutz allowed students to choose from only ninety-nine occupations.

Career Aspirations of the Undecided Student

It has been observed that each year a number of students entering college profess to be uncertain of their vocational future. The meaning of this uncertainty or indecision is not clear and the results of research on this topic are conflicting. In a study of vocationally undecided students, Ziller concluded that undecided students were more cautious and less willing to take risks. (Ziller, 1957, pp. 61-64) In another study, student indecision was found to be related to dependency, and in one further study, a negative relationship was reported between student indecision and persistence in college. (Ashby, Wall, and Osipow, 1966) Another study found students achieving a low initial grade-point average were less likely to graduate if their statements about vocational or academic goals expressed certainty. In other words, being definite in their plans worked against them. (Abel, 1966, pp. 1042-45) Concurrently, in Holland and Nichols' development of an indecision scale, they found

indecision to be positively related to creativity. (Holland and Nichols, 1964, pp. 55-65) It is possible, according to Bohn, that vocational indecision at the time of matriculation is largely a matter of immaturity in vocational interests or lack of interest development. (Bohn, 1966, pp. 306-09)

Little support was found in the literature for the widely held belief that something is "wrong" with the individual who has an unpatterned Strong Vocational Interest Battery profile. (Munday, et al., 1967, pp. 1-19) Athelstan contrasted the characteristics of entering college men, with unpatterned interests, with entering college men having patterned interests. (Athelstan, 1966, pp. 85-105) The "patterned" and "unpatterned" men did not differ on Minnesota Multiphastic Personality Inventory scores, academic aptitude, age, dropout rate, frequency of seeking vocational counseling, or items of personal data. In this same vein, Baird compared students who indicated they were undecided about a major in college and a vocational choice with all other college students. (Baird, 1967, pp. 1-14) He found no differences between these two groups with respect to ACT scores, high school grades, educational goals or plans, family background, or college objectives.

Another recent study suggests that indecision among bright students may be caused by their capacity to do many

things and to the many alternatives open to them rather than to their confusion about those alternatives. No evidence was found to support the notion that most undecided students are maladjusted or abnormal. (Baird, 1968, pp. 174-79)

Studies thus far presented illustrate that undeclared college students are not really so different from declared students. In fact, some research data indicate that there may be value in remaining undeclared during the first several semesters of college. This concept deserves special attention in the community college where student exploration should be encouraged.

General Prediction of Student Success

Some of the better predictors of student success in college have been high school grade-point average (Libby, 1963, p. 16), intelligence test scores, standardized achievement test scores, and rank in high school class. (Richards and Lutz, 1967, pp. 1-30) The expression "better predictors" must be interpreted with emphasis upon the idea of relative value because, with few exceptions, correlation coefficients described in the literature were considered too low to recommend use of the predictors for advising, counseling or placement of individuals.

Prior academic performance has been the most consistently good single predictor of success in college. (Morgenfeld, 1967, pp. 75-98) Socioeconomic factors have not been

significant predictors of success. (Malone, 1965, pp. 113-48) In some studies the variables of work-related factors have correlated significantly with college success. (Livers, 1963)

Travers, in his "Significant Research on the Prediction of Academic Success," presented an analysis of the prediction of success in college:

> . . . subject matter tests and tests of scholastic aptitude have some value in predicting success in college but they are less valid than the high school record for this purpose. It is probable that the most satisfactory method of predicting general academic success in college is to combine a measure of high success with a measure of scholastic aptitude. (Donahue, et al., 1949, p. 176)

Twenty-one research studies have been reviewed in which college success was correlated with average grade and rank in high school. The findings revealed that the average grade in high school is a predictor of college success that is fully as reliable as rank in class--in fact, even more reliable than class rank. (Cosand, 1953, pp. 338-64)

In an unpublished dissertation, Malone (1965) conducted a study which used educational and socioeconomic information about students to predict success in training. Malone's study, very similar in structure to one conducted by Livers (1963), was completed by post-high school students and items consisted of the following: high school grade-point average, intelligence test scores, standardized achievement test scores, rank in class, occupations of father and mother,

educational levels of father and mother, and a list of high school subjects and grades. As a result of his study, Malone concluded:

> 1. Academic factors, principally high school grade point average, rank in high school class, and grade point averages in selected high school subject areas were the most consistent single predictors of success.
>
> 2. Dailey Vocational Test scores were statistically significant predictors of success although not consistently as high as academic variables.
>
> 3. In general, socioeconomic factors were not significant as predictors of success in training. The variables of age, vocational maturity, and a few work values did correlate significantly with the criterion in some cases, however.
>
> 4. Multiple correlations, using instructor ratings of success as the dependent variable, consistently showed student characteristics such as grade point averages (composite and subject area), rank in high school class and type of curriculum pursued in high school to be among the highest predictors, both when used alone and when combined with Dailey Vocational Test scores. (Malone, 1965, pp. 113-48)

Hoyt and Munday (1966) have suggested that ACT data have highly acceptable validity for predicting academic success in community colleges. They found that the ACT predictors yielded correlation coefficients of .62, .57, .61, .61, and .64 with English, mathematics, social studies, natural sciences, and overall grades, respectively.

The present study serves to assess the validity, relative to the above findings, of the Hoyt-Munday correlations as applied to community colleges in San Diego.

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Appendix A

AMERICAN COLLEGE TEST DESCRIPTION (ACT)

The information from ACT provides data related to student background, special needs, and potential for achievement in nonacademic fields. The three student assessment instruments developed by ACT are summarized below.

Four-part Test Battery

The English usage examination is an 80-item, 50 minute test that measures the student's understanding and the use of the basic elements in correct and effective writing, punctuation, capitalization, usage, phraseology, style and organization.

The mathematics usage test is a 40-item, 50 minute examination that measures the student's mathematical reasoning ability. This test emphasizes the solution of practical quantitative problems which are encountered in many college curricula. It also includes a sampling of mathematical techniques covered in high school courses.

The social studies reading examination is a 52-item, 40 minute test that measures the evaluative reasoning and problem-solving skills required in social studies. It measures the student's comprehension of reading passages taken from typical social studies materials. It also contains a few items that test the student's understanding of basic concepts, knowledge of sources of information, and knowledge of special study skills needed in college work in the social studies field.

The natural sciences reading examination is a 52-item, 40 minute test that measures the critical reasoning and problem-solving skills required in the natural sciences. Emphasis is placed on the formulation and testing of hypotheses and the evaluation of reports of scientific experiments.

Four Self-reported High School Grades

During the ACT testing session, each student is asked to report his last grade prior to his senior year in each of the areas of English, mathematics, social studies and natural sciences. These self-reports are intended to estimate the student's high school academic achievement, for presumably high school grades depend upon both academic aptitude and characteristics such as persistence and study habits.

Student Profile Section

In 1964-65, ACT developed a special student information section for inclusion in its regular assessment program. Completing the Student Profile Section (SPS) gives the student an opportunity to tell his college about his particular aspirations, needs, potentials, and background. For example, he indicates what vocation he plans to enter after college and what special role he hopes to play in the occupation. The student also lists his probable major field of study and the type of educational degree he is seeking. (American College Technical Report, 1965)